

2005 Monitoring Summary



Basin Assessment Site

Yellow Leaf Creek at Chilton County Road 43 (32.91956/-86.64174)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Yellow Leaf Creek watershed for biological and water quality monitoring as part of the [2005 Assessment of the Alabama, Coosa, and Tallapoosa \(ACT\) River Basins](#). The objectives of the ACT Basin Assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the ACT basin group

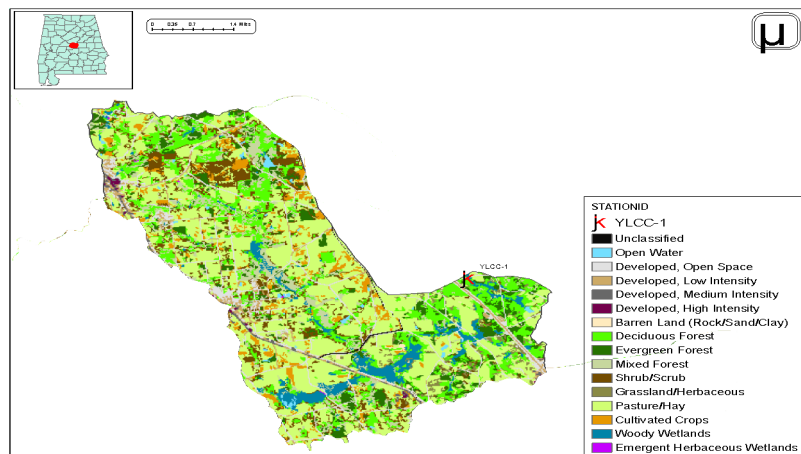


Figure 1. Sampling location and landuse within the Yellow Leaf Creek watershed at YLCC-1

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Yellow Leaf Creek at YLCC-1 is a [Fish & Wildlife \(F&W\)](#) stream located in Chilton County (Fig. 1). It is located within the Southern Inner Piedmont (45a) ([Griffith et al. 2001](#)). Landuse in the watershed is primarily pasture and forest (31%). There was a total of 14 permitted discharges in the watershed. Population density was also high.

REACH CHARACTERISTICS

[General observations](#) (Table 2) and [habitat assessments](#) (Table 3) were completed during the macroinvertebrate assessment. In comparison with reference reaches in the same ecoregion, they give an indication of the physical condition of the site and the quality and availability of habitat. Yellow Leaf Creek at YLCC-1 was a medium-gradient, glide pool stream with a bottom substrate consisting mostly of sand. There was evidence of bank erosion within the reach. Habitat quality and availability was rated as *marginal* for supporting diverse aquatic macroinvertebrate communities.

BIOASSESSMENT RESULTS

Benthic macroinvertebrate communities were sampled using ADEM's [Intensive Multi-habitat Bioassessment methodology \(WMB-I\)](#). The WMB-I uses measures of taxonomic richness, community composition, and community tolerance to assess the overall health of the macroinvertebrate community. Each metric is scored on a 100 point scale. The final score is an average of all individual metric scores. The final score indicated the biological community at YLCC-1 to be *poor* due to a low percentage of plecoptera genera, predators, non-insect taxa and nutrient tolerant organisms for this stream type (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics	
Drainage Area (mi ²)	29
Ecoregion ^a	45a
% Landuse	
Open water	1
Wetland	Woody 5
	Emergent herbaceous <1
Forest	Deciduous 16
	Evergreen 7
	Mixed 8
Shrub/scrub	9
Grassland/herbaceous	2
Pasture/hay	38
Cultivated crops	5
Development	Open space 7
	Low intensity 3
	Moderate intensity <1
	High intensity <1
Barren	<1
Population/km ^{2b}	61
# NPDES Permits ^c	TOTAL 14
	Construction Stormwater 13
	Municipal Individual 1

a.Southern Inner Piedmont

b.2000 US Census

c.#NPDES permits downloaded from ADEM's NPDES Management System database, 9 Jun 2008

Table 2. Physical characteristics of Yellow Leaf Creek at YLCC-1, June 16, 2005.

Physical Characteristics	
Width (ft)	35
Canopy cover	Shaded
Depth (ft)	
	Riffle 0.8
	Run 1.5
	Pool 3.0
% of Reach	
	Run 50
	Pool 50
% Substrate	
	Gravel 10
	Sand 74
	Silt 5
	Organic Matter 11

Table 3. Results of the habitat assessment conducted on Yellow Leaf Creek at YLCC-1, June 16, 2005.

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	58	Marginal (41-58)
Sediment deposition	54	Marginal (41-58)
Sinuosity	58	Marginal (45-64)
Bank and vegetative stability	39	Marginal (35-59)
Riparian buffer	43	Poor (<50)
Habitat assessment score	116	
% Maximum score	53	Marginal (41-58)

Table 4. Results of the macroinvertebrate bioassessment of Yellow Leaf Creek at YLCC-1 conducted on June 16, 2005.

Macroinvertebrate Assessment Results			
	Results	Scores	Rating
Taxa richness measures			
# EPT genera	14	56	Fair (37-56)
Taxonomic composition meas-			
% Non-insect taxa	20	23	Very Poor (<30.9)
% Plecoptera	0	0	Very Poor (<1.86)
% Dominant taxa	27	57	Fair (47.0-70.5)
Functional composition meas-			
% Predators	2	0	Very Poor (<15.1)
Tolerance measures			
Beck's community tolerance index	4	18	Poor (10.6-21.2)
% Nutrient tolerant organisms	57	22	Very Poor (<25.4)
WMB-I Assessment Score	---	25	Poor (19-37)

WATER CHEMISTRY

Results of water chemistry are presented in Table 5. [In situ measurements](#) and [water samples](#) were collected monthly, semi-monthly (metals), or quarterly (pesticides, herbicides (atrazine), and semi-volatile organics) during March through October of 2005 to help identify any stressors to the biological communities. Median concentrations for total organic carbon (TOC) and atrazine were higher than expected for this ecoregion. The site did not exceed [numeric criteria for metals](#). However, median concentrations of total and dissolved iron and total and dissolved manganese were higher than expected the 90th percentile of reference reach data collected in ecoregion 45a.

CONCLUSIONS

Bioassessment results indicated the macroinvertebrate community to be in *poor* condition. Habitat assessment results were scored as *marginal* due to sedimentation, bank instability, a lack of instream habitat and absence of riparian buffer. Results of intensive water quality sampling suggest higher than expected metal concentrations and sedimentation to be potential causes for the lower biological conditions of the reach.

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Table 5. Summary of water quality data collected March-October, 2005. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL) when results were less than this value. Median, average (Avg), and standard deviations (SD) values were calculated by multiplying the MDL by 0.5 when results were less than this value.

Parameter	N	Min	Max	Median	Avg	SD
Physical						
Temperature (°C)	9	13.0	27.0	25.0	22.7	5.1
Turbidity (NTU)	9	7.1	17.5	9.8	10.6	3.4
Total Dissolved Solids (mg/L)	7	18.0	74.0	51.0	51.6	19.3
Total Suspended Solids (mg/L)	7	4.0	22.0	15.0	13.9	6.0
Specific Conductance (µmhos)	9	49.4	68.1	55.3 ^M	57.8	7.1
Hardness (mg/L)	5	15.0	23.2	18.8 ^M	18.9	3.1
Alkalinity (mg/L)	7	10.5	20.9	14.7	14.1	3.6
Stream Flow (cfs)	8	7.8	101.1	49.6	51.4	
Chemical						
Dissolved Oxygen (mg/L)	9	5.5	9.2	6.3	6.9	1.3
pH (su)	9	6.4	7.7	6.8	6.9	0.4
Ammonia Nitrogen (mg/L)	7	0.015	0.045	0.008	0.018	0.015
Nitrate+Nitrite Nitrogen (mg/L)	7	0.003	0.129	0.069	0.067	0.049
Total Kjeldahl Nitrogen (mg/L)	7	0.150	0.602	0.457	0.402	0.177
Total Nitrogen (mg/L)	7	0.140	0.654	0.479	0.436	0.172
Dissolved Reactive Phosphorus (mg/L)	7	0.004	0.033	0.008	0.011	0.010
Total Phosphorus (mg/L)	7	0.016	0.073	0.040	0.039	0.019
CBOD-5 (mg/L)	7	1.0	3.5	1.5	1.7	1.2
TOC (mg/L)	1				7.6 ^M	
^J Chlorides (mg/L)	6	4.8	6.7	5.5	5.5	0.7
Atrazine (µg/L)	1				0.09 ^M	
Total Metals						
Aluminum (mg/L)	4	0.015	0.340	0.121	0.147	0.140
Iron (mg/L)	4	0.547	2.570	1.900 ^M	1.729	0.989
Manganese (mg/L)	4	0.075	0.382	0.183	0.206	0.128
Dissolved Metals						
Aluminum (mg/L)	4	< 0.015	< 0.015	0.008	0.008	0.000
Antimony (µg/L)	3	< 2	< 2	1	1	0
Arsenic (µg/L)	4	< 10	< 10	5	5	0
Cadmium (mg/L)	3	< 0.005	< 0.005	0.003	0.003	0.000
Chromium (mg/L)	3	< 0.004	< 0.004	0.002	0.002	0.000
Copper (mg/L)	4	< 0.005	1.990	0.003	0.499	0.994
Iron (mg/L)	3	0.384	0.460	0.429 ^M	0.424	0.038
Lead (µg/L)	3	< 2	< 2	1	1	0
Manganese (mg/L)	3	0.039	0.234	0.102 ^M	0.125	0.100
Mercury (µg/L)	3	< 0.30	< 0.30	0.15	0.15	0.00
Nickel (mg/L)	3	< 0.006	< 0.006	0.003	0.003	0.000
Selenium (µg/L)	3	< 10	< 10	5	5	0
Silver (mg/L)	4	< 0.003	< 0.003	0.002	0.002	0.000
Thallium (µg/L)	4	< 0.006	< 1	0.5	0.4	0.2
Zinc (mg/L)	3	< 0.006	< 0.006	0.003	0.003	0.000
Biological						
^J Chlorophyll a (mg/L)	7	0.71	3.20	1.07	1.46	0.86
^J Fecal Coliform (col/100 mL)	7	50	1500	100	434	603

J=estimate; N=#of samples; Min=Minimum; Max=Maximum; M=value> 90% of all verified ecoregional reference data within ecoregion 45a